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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
10/664,157	09/17/2003	Yong-Tac Kim	61610070AA	4172

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EXAMINER	
CHU, HELEN OK	
ART UNIT	**PAPER NUMBER**
1745	

SHORTENED STATUTORY PERIOD OF RESPONSE	MAIL DATE	DELIVERY MODE
3 MONTHS	03/16/2007	PAPER

Please find below and/or attached an Office communication concerning this application or proceeding.

If NO period for reply is specified above, the maximum statutory period will apply and will expire 6 MONTHS from the mailing date of this communication.

Office Action Summary	Application No.	Applicant(s)	
	10/664,157	KIM ET AL.	
	Examiner	Art Unit	
	Helen O. Chu	1745	

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) OR THIRTY (30) DAYS, WHICHEVER IS LONGER, FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

1)☒ Responsive to communication(s) filed on _____.

2a)☒ This action is **FINAL**. 2b)☐ This action is non-final.

3)☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

4)☒ Claim(s) *1-25* is/are pending in the application.

4a) Of the above claim(s) _____ is/are withdrawn from consideration.

5)☐ Claim(s) _____ is/are allowed.

6)☒ Claim(s) *1-25* is/are rejected.

7)☐ Claim(s) _____ is/are objected to.

8)☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

9)☐ The specification is objected to by the Examiner.

10)☐ The drawing(s) filed on _____ is/are: a)☐ accepted or b)☐ objected to by the Examiner.

Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).

Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).

11)☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

Priority under 35 U.S.C. § 119

12)☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).

a)☐ All b)☐ Some * c)☐ None of:

1.☐ Certified copies of the priority documents have been received.

2.☐ Certified copies of the priority documents have been received in Application No. _____.

3.☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

* See the attached detailed Office action for a list of the certified copies not received.

Attachment(s)

1) ☐ Notice of References Cited (PTO-892)
2) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)
3) ☐ Information Disclosure Statement(s) (PTO/SB/08) Paper No(s)/Mail Date _____.
4) ☐ Interview Summary (PTO-413) Paper No(s)/Mail Date. _____ .
5) ☐ Notice of Informal Patent Application
6) ☐ Other: _____.

DETAILED ACTION

1. The Applicants Arguments/Remarks have been received on January 19, 2007. Claims 19 and 23 have been amended.

2. The text of those sections of Title 35, U.S.C. code not included in this action can be found in the prior Office Action.

Claim Rejections - 35 USC § 112

3. The rejections under 35 U.S.C. 112, second paragraph, on claims 19 and 23 are withdrawn because the Applicants have amended the claims.

Claim Rejections - 35 USC § 103

4. The rejections under 35 U.S.C. 103(a) as being unpatentable over Skotheim et al. in view of Sotomura on claims 1-7, 9-17, 19-24 are maintained. The rejection is repeated below for convenience

5. The rejections under 35 U.S.C. 103(a) as being unpatentable over Skotheim et al. (US Patent 5,961,672) in view of Sotomura (US Patent 6,245,458 B1), in further view of Zuiho et al. (JP Publication 10-101793) as applied to claims 8 and 18 are maintained. The rejection is repeated below for convenience.

6. The rejections under 35 U.S.C. 103(a) as being unpatentable over Skotheim et al. (US Patent 5,961,672) in view of Sotomura (US Patent 6,245,458 B1 as evidence by Fauteux et al. (US Patent 6,030,719) as applied to claims 24 and 25 are maintained. The rejection is repeated below for convenience

7. The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

> (a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negatived by the manner in which the invention was made.

8. Claims 1-7, 9-17, 19-24 are rejected under 35 U.S.C. 103(a) as being unpatentable over Skotheim et al. (US Patent 5,961,672) in view of Sotomura (US Patent 6,245,458 B1).

In regard to claims 1-4, 6, 7, 9, 20, 21, 24, the Skotheim et al. discloses a secondary battery with a composite lithium anode that stabilizes against dendrite formation with a thin film of lithium ion-conductive polymer interposed between the lithium metal and the electrolyte (Column 2, Lines 41-45). The Skotheim et al. reference further discloses that the electroconductive polymer film may be any conjugated structure, which is capable of being doped electrically conductive by lithium ions (Column 6, Lines 55-58), but does not disclose an organosulfur protective layer. However, the Sotomura reference discloses an electrode composite that can be used in a metallic lithium anode (Column 2,Lines 1-4), which exhibits high energy density and gives a high charging and discharging efficiency and good charging and discharging cycle life property used in a secondary battery (Column 2, Lines 39-44). The lithium electrolyte as part of the electrode gelled with a polyethylene oxide polymer (Column 5, Lines 43-58) onto the electrode composite of 2,5, dimercapto-1,3,4-thiadiazole (Column 4, Line 15) with an electrically conductive support such as doped polyaniline (Column 4, lines 56-60). Therefore, it would have been obvious to one of ordinary skill at the time

the invention was made to incorporate the organosulfur protective layer as disclosed by Sotomura reference to the lithium anode as disclosed by the Skotheim et al. reference in order to provide a secondary battery with high energy density and current output.

In regard to claims 5, 19, 23, it would have been obvious to one of ordinary skill to only put an organosulfur (100wt %) on the electrode and no polyaniline (0 wt%) compound or polyethylene oxide (0 wt %) as a reference electrode for testing purposes and comparative examples.

In regards to claim 22, the Sotomura reference discloses the average molecular of the ionic conductive material to have an average molecular weight to be 20,000 (Column 6, Lines 17-23)

It is noted that claims 10-17 are product-by-process claims. "Even though product-by-process claims are limited by and defined by the process, determination of patentability is based on the product itself. The patentability of a product does not depend on its method of production. If the product in the product-by-process claim is the same as or obvious from a product of the prior art, the claim is unpatentable even though the prior product was made by a different process." In re Thorpe, 777 F. 2d 695, 698, 227 USPQ 964, 966 (Fed. Cir. 1985). Since, the doped electron conductive polymer as disclosed by Sotomura is similar to that of the Applicant's, Applicant's process is not given patentable weight in this claim.

9. Claims 8 and 18 are rejected under 35 U.S.C. 103(a) as being unpatentable over Skotheim et al. (US Patent 5,961,672) in view of Sotomura (US Patent 6,245,458 B1) as applied to claim 6, in further view of Zuiho et al. (JP Publication 10-101793).

In regard to claims 8 and 18, the Sotomura reference discloses the use of polyaniline polymer obtained by means of an electrolytic polymerization from aniline or derivatives with an electric conductivity of 10^{-5} S/cm (Column 4, Lines 30-47). However, it does not disclose the use of emerald base polymer made of polyaniline or a doping ratio of about 30%. The Zuiho et al. discloses polyaniline emerald base polymer with the electric conductivitiy in the range of 10^{-10}-101S/cm (Abstract). It would have been obvious to one of ordinary skill at the time the invention was made to replace polyaniline as disclose by Sotomura with other polyaniline derivatives such as the polyaniline emerald base compound with the same physical properties as disclosed by Zuiho et al., since it has been held to be within the general skill of a worker in the art to select a known material on the basis of its suitability for the intended use as a matter of obvious design choice. *In re Leshin, 125 USPQ 416*. Furthermore, the electron conductive polymer polyaniline is the same as the Applicants' claimed invention, therefore, the physical property is the same such as the doping ratio of at least 30%.

10. Claim 24 and 25 are rejected under 35 U.S.C. 103(a) as being unpatentable over Skotheim et al. (US Patent 5,961,672) in view of Sotomura (US Patent 6,245,458) in further view of Chu (US Patent 5,523,179) as evidence by Fauteux et al. (US Patent 6,030,719).

The Skotheim et al. discloses a secondary battery with a composite lithium anode that stabilizes against dendrite formation with a thin film of lithium ion-conductive polymer interposed between the lithium metal and the electrolyte (Column 2, Lines 41-45) and the Sotomura reference discloses an organosulfur protective layer on composite electrodes, but does not disclose weight percentage of the compounds. However, the Chu reference discloses lithium/organosulfur batteries are known to be low cost and low equivalent weight (Column 2,Lines 1-3). The Chu reference further discloses an active-sulfur material in a weight percent of 20 to 80%, an ionically conductive material of 15%, and 40% electronically conductive material (Claim 42(b)). It would have been obvious to one of ordinary skill to combine the active material with the weight percentage as disclosed by Chu to the electrodes as disclosed by Skotheim et al. in order to produce an efficient battery of low cost and weight. Furthermore, the Fauteux et al. presents evidence in a secondary battery cell configuration, that an anode and cathode will become interchangeable with each other depending on whether the cell is charging or discharging (Column 3, Lines 41-44).

Response to Arguments

11. Applicant's arguments filed January 19, 2007 have been fully considered but they are not persuasive.

Applicants principal arguments are

a. *The Examiner relies on lines 1-4 of column 2 of Sotomura for the assertion that "Sotomura discloses an organosulfur protective layer that can be used in a metallic lithium anode" (see the bottom of page 5 of the Office Action). Applicants*

respectfully disagree. What Sotomura states in that passage is that organic sulfide compounds may be "combined with a metallic lithium anode" in a battery (column 2, line 3). This merely means that both a metallic lithium anode and an organosulfur compound may be included in a battery. The organosulfur compound Sotomura refers to is being used as the cathode of the battery (see column 2, lines (4-8 and 28-32). Therefore, Sotomura does not teach an organosulfur protective layer in a metallic lithium anode.

b. *There is also no motivation for one of ordinary skill in the art faced with the problem presented in Skotheim, to look to the teaching of Sotomura because the references address completely different problems.*

c. *The Examiner cited Fauteux for the teaching that an anode and cathode become interchangeable with each other depending on whether the cell is charging or discharging. However, even if the negative electrode of Chu, which comprises a lithium metal layer, becomes the positive electrode, and the positive electrode of Chu, which comprises the active-sulfur material, becomes the negative electrode, one does not arrive at the claimed invention. Rather, in this scenario, the negative electrode comprises an active-sulfur, but not a lithium metal layer. Therefore, none of the references teach an electrode including both an organosulfur material and a lithium metal layer, as required by independent claim 24.*

In response to Applicants' arguments, please consider the following.

a. It is well known to one of ordinary of the secondary battery art that a secondary battery has the capability of discharging and charging. The anode and cathode becomes interchangeable in a secondary battery. This is not only from the knowledge of the Examiner but also, the Fauteux reinforces this known fact. The Skotheim et al. reference teaches the use of a lithium anode with an additional layer on the surface of the anode, the reference further adds, the electroconductive polymer film (the layer on the surface of the anode) may be a conjugated structure which is capable of being doped electrically conductive by lithium ions (Column 6, Lines 55-59). The Sotomura et al. reference uses a composite electrode with an organic disulfide fro a battery which provides high voltage when used with a lithium anode. This statement provides evidence that the organic disulfide is capable of doping lithium ions. Further, the Sotomura et al. reference provides motivation that when the organic disulfide used in conjunction with the lithium anode or lithium ions from the lithium anode it would provide higher voltage.

b. There is motivation to combine the reference as taught by Skotheim and Sotomura. Please refer to "a" of Examiner's response and the rejection provided above.

c. To summarize, the Fauteux reference teaches the cathode and the anodes can be interchangeable when charging and discharging in a secondary battery. The Skotheim et al. reference teaches a secondary battery with a lithium anode and an additional protective surface layer that can be conductive or

capable of doping lithium. The Sotomura reference teaches a secondary battery with a composite electrode and an organic sulfur material surface layer which provides higher voltage when used with lithium ions from the anode. In addition, it is known as disclosed from the Sotomura et al. reference a lithium layer can be used in conjunction with a sulfur material on the same electrode. Please refer to Column 1, Lines 57-64.

Conclusion

THIS ACTION IS MADE FINAL. Applicant is reminded of the extension of time policy as set forth in 37 CFR 1.136(a).

A shortened statutory period for reply to this final action is set to expire THREE MONTHS from the mailing date of this action. In the event a first reply is filed within TWO MONTHS of the mailing date of this final action and the advisory action is not mailed until after the end of the THREE-MONTH shortened statutory period, then the shortened statutory period will expire on the date the advisory action is mailed, and any extension fee pursuant to 37 CFR 1.136(a) will be calculated from the mailing date of the advisory action. In no event, however, will the statutory period for reply expire later than SIX MONTHS from the mailing date of this final action.

Any inquiry concerning this communication or earlier communications from the examiner should be directed to Helen O. Chu whose telephone number is (571) 272-5162. The examiner can normally be reached on Monday-Friday 8am-4:30pm.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Patrick Ryan can be reached on (571) 272-1292. The fax phone number for the organization where this application or proceeding is assigned is 571-273-8300.

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see http://pair-direct.uspto.gov. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free). If you would like assistance from a USPTO Customer Service Representative or access to the automated information system, call 800-786-9199 (IN USA OR CANADA) or 571-272-1000.

HOC

TRACY DOVE
PRIMARY EXAMINER

3/07